

1 **EXHIBIT 1 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
2 **DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

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Matthews International Corporation (MATW)

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26.55 -2.92 (-9.93%)

At close: February 7 at 4:00:01 PM EST

26.55 +0.00 +(0.02%)

After hours: February 7 at 6:55:55 PM EST

Jun 13, 2024 - Jun 19, 2024

Historical Prices

Daily

Currency in USD Download

Date	Open	High	Low	Close	Adj Close	Volume
Jun 18, 2024	24.29	24.61	23.42	24.31	23.89	463,400
Jun 17, 2024	26.23	26.44	24.32	24.57	24.15	547,300
Jun 14, 2024	26.54	26.71	26.15	26.45	25.99	190,300
Jun 13, 2024	27.06	27.19	26.54	27.01	26.54	107,600

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Griffon Corporation

79.04 -2.29%**DLX**

Deluxe Corporation

18.87 -5.74%**VMI**

Valmont Industries, Inc.

328.11 -0.82%**MDU**

MDU Resources Group...

16.57 -2.13%**BOOM**

DMC Global Inc.

7.92 +0.13%**CODI**

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20.50 -2.10%**BBU**

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22.69 +1.39%**BOC**

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1 **EXHIBIT 2 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
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MOODY'S RATINGS

Rating Action: Moody's Ratings downgrades Matthews' CFR to B1 from Ba3 on weakening operating performance; outlook changed to stable from negative

06 Aug 2024

New York, August 06, 2024 -- Moody's Ratings (Moody's) downgraded Matthews International Corporation's ("Matthews") corporate family rating ("CFR") to B1 from Ba3, and its probability of default rating to B1-PD from Ba3-PD. At the same time, we also downgraded the ratings on the company's \$300 million senior unsecured notes due December 2025 to B3 from B2. The speculative grade liquidity ("SGL") rating is SGL-2. Following the rating downgrades, we changed the outlook to stable from negative. Matthews is a designer, manufacturer and marketer of memorialization products, brand solutions and industrial automation solutions.

The rating downgrades were driven by weaker than anticipated operating performance and our expectation that Matthews' revenue will decline over the next 12-18 months. We anticipate financial Debt/EBITDA leverage will remain high around 5.0x based on our calculation, and free cash flow-to-debt will be sustained in the low single-digit range. Our expectation for weaker operating results, compared to historical levels, combined with credit metric deterioration contributed to the rating downgrades. The company's ongoing legal dispute with major customer, Tesla Inc. ("Tesla", Baa3 stable), was also a negative credit consideration.

RATINGS RATIONALE

Matthews' B1 CFR is constrained by recent declines in revenue and profitability primarily in its Industrial Technologies Segment, as well as the company's high financial leverage. We expect debt-to-EBITDA around 5x over the next 12 to 18 months. We anticipate lower sales in the company's Memorialization and Industrial Technologies segments, along with relatively flat top-line growth in its SGK Brand business, as price increase initiatives will not be able to fully offset diminishing demand. The credit profile also reflects risks to the company's operating performance, particularly due to a shift in product mix towards lower-margin offerings like cremation and converting line products, uncertainty in its energy storage business, and higher

costs for materials and labor.

All financial metrics cited reflect our standard adjustments.

The company's ongoing dispute with Tesla Inc., a major client of its energy storage solutions business which has alleged that the company has misappropriated Tesla's trade secrets, is a negative credit development. Matthews maintains that these allegations have no substantial impact on its operations. In addition, Matthews has experienced significant delivery delays due to Tesla's installation readiness, which has pressured working capital and cash flow generation. The ongoing confidential dispute with Tesla introduces considerable uncertainty regarding the long-term prospects of Matthews' energy storage business, a component of the company's Industrial Technologies segment (the segment accounts for 28% of revenue as of 30 June 2024). The dispute restricts Matthews' ability to market its dry battery electrode solutions to other automakers and could potentially put the company at risk of losing its intellectual property rights related to the technology. The dispute increases uncertainty and could place considerable strain on Matthews' operational performance.

Matthews' credit profile benefits from its leading position in the memorialization segment, given the generally stable demand for its caskets and other funeral products. The memorialization segment accounted for 46% of the revenue for the 12-month period ending 30 June 2024, contributing high margins and predictable cash flow to support Matthews' growth. The company is well-positioned to profit from the industry's gradual shift from traditional burials to cremation. We also consider the potential long-term growth of the Industrial Technologies segment a credit positive, primarily in the energy storage solutions business, amid rising demand for energy solutions in electric vehicles and renewable energy systems.

The B3 rating on the \$300 million senior unsecured notes due December 2025 is two notches below the B1 CFR, reflecting its junior position in the capital structure in relation to the company's secured debt, which includes a \$750 million revolving credit facility (unrated) due 2029.

Matthews' SGL-2 rating reflects our expectation that the company will maintain a good liquidity profile over the next 12 to 15 months, with \$43 million of cash on hand as of 30 June 2024, roughly \$248 million of available capacity under its \$750 million revolving credit facility due 2029 (unrated), and our expectation of free cash flow to debt in the low single-digit percentage range over the next 12 to 15 months. As of 30 June 2024, the company had a cash flow deficit, with a negative free cash flow-to-debt ratio of 1.4%, which we expect will improve. The company has a significant amount of working capital tied up in the energy storage business, which could be released as more equipment is delivered in the latter half of the fiscal year, thus improving the company's operating cash flow. As of 30 June 2024, Matthews had approximately \$499 million in outstanding borrowings under its \$750 million revolving credit facility expiring in January 2029 (unrated). This revolver is primarily employed

for seasonal working capital needs and discretionary purposes. Under the terms of the revolving credit facility, Matthews is required to maintain a net leverage ratio (as defined in the agreement) of less than or equal to 4.5x and an interest coverage ratio of greater than or equal to 3.0x. Upon a permitted acquisition, Matthews may elect a temporary leverage increase on a one-time basis, subject to a net leverage ratio of up to 5.0x and a secured net leverage of up to 4.0x for the subsequent four quarters. We expect the company to be in and maintain compliance with all covenants. Matthews senior unsecured notes are due December 2025. We anticipate that the company will be able to refinance this debt prior to its maturity date.

In addition, Matthews, through Matthews Receivables Funding Corporation, LLC ("Matthews RFC"), regularly sells its trade receivables up to \$125 million to a financial institution for an equivalent cash amount under a Receivables Purchase Agreement (RPA), set to expire in March 2026. As of 30 June 2024, there was approximately \$19.9 million available under this agreement. Furthermore, Matthews, through its U.K. subsidiary, utilizes non-recourse receivable factoring arrangements with third-party financial institutions to assist in managing working capital. As of 30 June 2024, there was approximately \$16 million available through these arrangements.

The stable outlook reflects our expectation of a revenue decline in the low single-digit percentage range and limited free cash flow generation over the next 12-18 months, which could constrain the company's capacity to repay debt or invest in growth opportunities. We anticipate that debt-to-EBITDA will remain high, around 5.0x, and the free cash flow-to-debt ratio will be in the low single-digit percentage range. We forecast an EBITDA margin of around 11% and interest coverage, calculated as EBITA-to-interest expense, of at least 2x over the same period.

FACTORS THAT COULD LEAD TO AN UPGRADE OR DOWNGRADE OF THE RATINGS

The ratings could be upgraded if Matthews demonstrates sustained revenue growth and profit margin expansion, while maintaining debt-to-EBITDA below 4.75x. A ratings upgrade would also require good liquidity and free cash flow-to-total-debt approaching the high single-digit range or higher.

The ratings could be downgraded if Matthews experiences a material contraction in revenue or profitability, free cash flow generation weakens, or liquidity deteriorates. The ratings could also be downgraded if the company adopts more aggressive financial policies that lead to debt-to-EBITDA remaining above 5.5x.

The principal methodology used in this rating was Business and Consumer Services published in November 2021 and available at <https://ratings.moodys.com/rmc-documents/356424>. Alternatively, please see the Rating Methodologies page on <https://ratings.moodys.com> for a copy of this methodology.

Matthews (NASDAQ: MATW), headquartered in Pittsburgh, PA, is a designer,

manufacturer and marketer of memorialization products, brand solutions and industrial automation solutions. We expect Matthews to generate revenue of nearly \$1.8 billion in 2024.

REGULATORY DISCLOSURES

For further specification of Moody's key rating assumptions and sensitivity analysis, see the sections Methodology Assumptions and Sensitivity to Assumptions in the disclosure form. Moody's Rating Symbols and Definitions can be found on <https://ratings.moodys.com/rating-definitions>.

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1 **EXHIBIT 3 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
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4 **FILED UNDER SEAL**

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1 **EXHIBIT 4 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
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1 **EXHIBIT 5 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
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1 **EXHIBIT 6 TO THE DECLARATION OF JACOB MILLER IN SUPPORT OF**
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1 **EXHIBIT 7 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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1 **EXHIBIT 8 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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1 **EXHIBIT 9 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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1 **EXHIBIT 10 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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Feb 03, 2025 - Feb 08, 2025

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Feb 7, 2025	27.09	27.84	25.57	26.55	26.55	768,000
Feb 6, 2025	30.50	30.96	28.10	29.47	29.47	729,000
Feb 5, 2025	27.16	27.52	25.89	26.74	26.74	1,038,200
Feb 4, 2025	27.81	28.09	27.11	27.11	27.11	245,600
Feb 3, 2025	27.37	28.89	26.93	27.94	27.94	178,300

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Deluxe Corporation
18.87 -5.74%**VMI**
Valmont Industries, Inc.
328.11 -0.82%**MDU**
MDU Resources Group...
16.57 -2.13%**BOOM**
DMC Global Inc.
7.92 +0.13%**CODI**
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1 **EXHIBIT 11 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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1 **EXHIBIT 12 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
62/793,333	01/16/2019	Porter Mitchell	MAX.409PR

CONFIRMATION NO. 1719

IMPROPER CPOA LETTER

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 PITTSBURGH, PA 15219-4429



OC000000136987380

Date Mailed: 12/09/2022

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 12/06/2022. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney has not been accepted because the party who is giving power has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A party who is not the applicant must become the applicant in accordance with 37 CFR 1.46(c) and appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. For a reissue application, reexamination proceeding, or supplemental examination proceeding, a patent owner who was not the applicant under 37 CFR 1.46 must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).

/byemane-brehan/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

186093
 DLA Piper LLP (US)/Matthews
 1650 Market Street, Suite 5000
 Philadelphia, PA 19103
 UNITED STATES

page 1 of 1

**CLAIMANTS'
EXHIBIT
C317**

*Matthews International Corp. et al.
v. Tesla, Inc.*
 JAMS File No. 5100001732

MATTHEWS-00006487

C317.1

AHB07724

PTO/AIA/80 (07-17)

Approved for use through 03/31/2021. OMB 0651-0035
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number:

186093

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number: 186093

OR

<input type="checkbox"/>	Firm or individual name	
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Matthews International Corporation
Two NorthShore Center
Pittsburgh, PA 15212

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature		Date	04-21-2022
-----------	---	------	------------

Name	Brian D. Walters	Telephone	(412) 442-8817
------	------------------	-----------	----------------

Title Senior Vice President and General Counsel

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MATTHEWS-00006488

C317.2

AHB07725

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Matthews International CorporationApplication No./Patent No.: 62/793,333 Filed/Issue Date: January 16, 2019Titled: SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

Matthews International Corporation, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):1. The assignee of the entire right, title, and interest.2. An assignee of less than the entire right, title, and interest (check applicable box): The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest. There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:1. From: Frank Bogenstahl To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at

Reel 051479, Frame 0069, or for which a copy thereof is attached.2. From: Rene Wolters To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at

Reel 051479, Frame 0327, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MATTHEWS-00006490

C317.4

AHB07727

PTO/AIA/96 (08-12)

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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STATEMENT UNDER 37 CFR 3.73(c)3. From: Christoph Lansing To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0468, or for which a copy thereof is attached.

4. From: Thomas Hackfort To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0643, or for which a copy thereof is attached.

5. From: Kay Wolters To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0789, or for which a copy thereof is attached.

6. From: Jorg Gottszky To: Saueressig GmbH & Co. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0878, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Nicholas Kokkinos/

Signature

Nicholas Kokkinos

Printed or Typed Name

December 6, 2022

Date

76,979

Title or Registration Number

[Page 2 of 2]

MATTHEWS-00006491

C317.5

AHB07728

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Supplemental Sheet to Statement Under 37 C.F.R. § 3.73(c) (CONTINUATION OF PART B)

Application 62/793,333

7. From: Saueressig GMBH & Co. KG to: Matthews International GMBH. The document was recorded in the United States Patent and Trademark Office at Reel 051566, Frame 0841, or for which a copy thereof is attached.

8. From: Matthews International GMBH to: Matthews International Corporation. The document was recorded in the United States Patent and Trademark Office at Reel 051888, Frame 0521, or for which a copy thereof is attached.

198738919.1

MATTHEWS-00006493

C317.7

AHB07730

Electronic Acknowledgement Receipt	
EFS ID:	47153851
Application Number:	62793333
International Application Number:	
Confirmation Number:	1719
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE
First Named Inventor/Applicant Name:	Porter Mitchell
Customer Number:	21269
Filer:	Nicholas Charalambos Kokkinos/Charles Vrscak
Filer Authorized By:	Nicholas Charalambos Kokkinos
Attorney Docket Number:	MAX.409PR
Receipt Date:	06-DEC-2022
Filing Date:	16-JAN-2019
Time Stamp:	15:32:58
Application Type:	Provisional

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part/.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Transmittal_Itr_POA_373c_Stm nt_6Dec2022.pdf	98592 cecf7cda66d12df6848a027321e3026ae338b85	no	1

Warnings:

MATTHEWS-00006494

C317.8

AHB07731

Information:					
2	Power of Attorney	POA.pdf	519377 4df461595b0bf5133eeb347dc5811c0f22a 7777	no	2
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	373c_Stmnt_6Dec2022.pdf	136508 50b474472bb0368e27b683e0a7e53726f9 10bb2	no	3
Warnings:					
Information:					
4	Assignee showing of ownership per 37 CFR 3.73	Suppl_373c_Stmnt_6Dec2022.pdf	115623 b730713056f836da61c61eb73d9cf93c359 0968b	no	1
Warnings:					
Information:					
Total Files Size (in bytes):				870100	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p>New Applications Under 35 U.S.C. 111 If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p>National Stage of an International Application under 35 U.S.C. 371 If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p>New International Application Filed with the USPTO as a Receiving Office If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Attorney Docket No.: 132258-016800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Frank Bogenstahl, et al.
Application No. : 62/793,333
Filed : January 16, 2019
Group Art Unit : N/A
Confirmation No. : 1719
Examiner : N/A

For: SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

**SUBMISSION OF POWER OF ATTORNEY
AND STATEMENT UNDER 3.73(c)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant respectfully submits the attached Power of Attorney and Statement Under 3.73(c) for Matthews International Corporation in the above-identified application.

Applicant believes no fees are associated with this filing. However, please charge any shortage in fees due or credit any excess fees in connection with the filing of these papers to Deposit Account No. 60-4406.

Respectfully submitted,
DLA Piper LLP (US)
/Nicholas Kokkinos/

Nicholas Kokkinos
Reg. No. 76,979

DLA PIPER LLP (US)
1650 Market Street, Suite 5000
Philadelphia, PA 19103-7348
Telephone: (215) 656-3300
Date: December 6, 2022

MATTHEWS-00006496

C317.10

AHB07733



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
62/793,333	01/16/2019	Porter Mitchell	MAX.409PR

21269
 PEPPER HAMILTON LLP
 UNION TRUST BUILDING
 501 GRANT STREET, SUITE 300
 PITTSBURGH, PA 15219-4429

CONFIRMATION NO. 1719
POA ACCEPTANCE LETTER



OC000000115065102

Date Mailed: 03/02/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/25/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000 or (571) 272-4200 or 1-888-786-0101**.

/qtran/

page 1 of 1

MATTHEWS-00006497

C317.11

AHB07734

PTO/AIA/96 (07-17)

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

 Practitioners associated with Customer Number: **21269**
OR
 Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

 The address associated with Customer Number: **21269**
OR

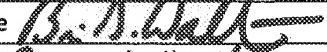
<input type="checkbox"/>	Firm or individual name	
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: MATTHEWS INTERNATIONAL CORPORATION
Two NorthShore Center
Pittsburgh, PA 15212

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature 	Date 09-25-2017
Name Brian D. Walker	Telephone 1-412-442-8217
Title Vice President, General Counsel	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MATTHEWS-00006498

C317.12

AHB07735

PTO/AIA/96 (08-12)

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Matthews International CorporationApplication No./Patent No.: 62/793,333 Filed/Issue Date: January 16, 2019Titled: SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

Matthews International Corporation, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):1. The assignee of the entire right, title, and interest.2. An assignee of less than the entire right, title, and interest (check applicable box): The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest. There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:1. From: Frank Bogenstahl To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at

Reel 051479, Frame 0069, or for which a copy thereof is attached.2. From: Rene Wolters To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at

Reel 051479, Frame 0327, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MATTHEWS-00006499

C317.13

AHB07736

PTO/AIA/96 (08-12)

Approved for use through 01/31/2013. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)3. From: Christoph Lansing To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0468, or for which a copy thereof is attached.

4. From: Kay Wolters To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0789, or for which a copy thereof is attached.

5. From: Thomas Hackfort To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0643, or for which a copy thereof is attached.

6. From: Jorg Gottszky To: Saueressig GMBH & Go. KG

The document was recorded in the United States Patent and Trademark Office at
 Reel 051479, Frame 0878, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Nicholas Kokkinos/

February 25, 2020

Signature

Date

Nicholas Kokkinos

76,979

Printed or Typed Name

Title or Registration Number

[Page 2 of 2]

MATTHEWS-00006500

C317.14

AHB07737

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Supplemental Sheet to Statement Under 37 C.F.R. § 3.73(c) (CONTINUATION OF PART B)

Application 62/793,333

7. From: Saueressig GMBH & Co. KG to: Matthews International GMBH. The document was recorded in the United States Patent and Trademark Office at Reel 051566, Frame 0841, or for which a copy thereof is attached.

8. From: Matthews International GMBH to: Matthews International Corporation. The document was recorded in the United States Patent and Trademark Office at Reel 051888, Frame 0521, or for which a copy thereof is attached.

MATTHEWS-00006502

C317.16

AHB07739

Electronic Acknowledgement Receipt	
EFS ID:	38686368
Application Number:	62793333
International Application Number:	
Confirmation Number:	1719
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE
First Named Inventor/Applicant Name:	Porter Mitchell
Customer Number:	20995
Filer:	Nicholas Charalambos Kokkinos/Charles Vrsnak
Filer Authorized By:	Nicholas Charalambos Kokkinos
Attorney Docket Number:	MAX.409PR
Receipt Date:	25-FEB-2020
Filing Date:	16-JAN-2019
Time Stamp:	15:48:08
Application Type:	Provisional

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part/.zip	Pages (if appl.)
1	Power of Attorney	GPOA_AIA_Executed_Matthew slntlCorporation.pdf	88090 fb9da4e18a00ecb8a6256b02fcf4e5fbff24 92a	no	1

Warnings:

MATTHEWS-00006503

C317.17

AHB07740

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing

Information:

2	Assignee showing of ownership per 37 CFR 3.73	373c_Stmnt_25Feb2020.pdf	124722 75bdc6cc1dceaf84f28788d80550f2a9e802 a3bc	no	3
---	---	--------------------------	--	----	---

Warnings:

Information:

3	Assignee showing of ownership per 37 CFR 3.73	Suppl_373c_Stmnt_25Feb2020.pdf	487584 77b76daf83550c34ddf9d1e6c020ce2ad9a 6732c	no	1
---	---	--------------------------------	--	----	---

Warnings:

Information:

Total Files Size (in bytes):	700396
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

MATTHEWS-00006504

C317.18

AHB07741



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
62/793,333	01/16/2019	Porter Mitchell	MAX.409PR

CONFIRMATION NO. 1719

20995
 KNOBBE MARTENS OLSON & BEAR LLP
 2040 MAIN STREET
 FOURTEENTH FLOOR
 IRVINE, CA 92614

37 CFR 1.48(d)
ACKNOWLEDGEMENT LETTER



OC000000106181308

Date Mailed: 02/27/2019

NOTICE OF ACCEPTANCE OF REQUEST UNDER 37 CFR 1.48(d)

This is in response to the applicant's request under 37 CFR 1.48(d) submitted on 02/25/2019.

">The request under 37 CFR 1.48(d) to correct the inventorship, to correct or update the name of an inventor, or to correct the order of names of joint inventors is accepted.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/byemane-brehan/

page 1 of 1

MATTHEWS-00006505

C317.19

AHB07742



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
62/793,333	01/16/2019		280	MAX.409PR		

CONFIRMATION NO. 1719

UPDATED FILING RECEIPT

20995
 KNOBBE MARTENS OLSON & BEAR LLP
 2040 MAIN STREET
 FOURTEENTH FLOOR
 IRVINE, CA 92614



OC000000106181305

Date Mailed: 02/27/2019

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Porter Mitchell, Chandler, AZ;
 Frank Bogenstahl, Ahaus - Wessum, GERMANY;
 René Wolters, Stadtlohn, GERMANY;
 Christoph Lansing, Vreden, GERMANY;
 Jörg Gottszky, Vreden, GERMANY;
 Kay Wolters, Stadtlohn, GERMANY;
 Thomas Hackfort, Ahaus - Alstatte, DE;

Applicant(s)

Maxwell Technologies, Inc., San Diego, CA;

Power of Attorney:

Ian Gillies--62280

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

page 1 of 3

MATTHEWS-00006506

C317.20

AHB07743

Title

SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier

license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

Docket No.: MAX.409PR

Page 1 of 2

Please Direct All Correspondence to Customer Number 20995

REQUEST TO CORRECT INVENTORSHIP

Inventor	:	Porter Mitchell, et al.
App. No	:	62/793333
Filed	:	January 16, 2019
For	:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE
Examiner	:	Unassigned
Art Unit	:	Unassigned
Conf. No.	:	1719

Commissioner for Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

Dear Commissioner:

Pursuant to 37 CFR 1.48(d), this Request is being made to correct inventorship in the above-identified provisional application to reflect the following inventors:

- Porter Mitchell
- Frank Bogenstahl
- Kay Wolters
- Thomas Hackfort
- René Wolters
- Christoph Lansing; and
- Jörg Gottszky

In accordance with 37 C.F.R. §1.48, Applicants hereby request that the following Inventors, Frank Bogenstahl, René Wolters, Christoph Lansing, and Jörg Gottszky, be added to the inventorship of the present Application.

MATTHEWS-00006509

C317.23

AHB07746

Docket No.: MAX.409PR
App. No.: 62/793333

February 25, 2019
Page 2 of 2

Please Direct All Correspondence to Customer Number 20995

This Request is accompanied by an Application Data Sheet and the processing fee of \$50 as directed under 37 CFR 1.17(q).

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE MARTENS OLSON & BEAR LLP

Dated: February 25, 2019

By: /Ian W. Gillies/

Ian W. Gillies
Registration No. 62,280
Registered Practitioner
Customer No. 20995
(415) 954-4114

MATTHEWS-00006510

C317.24

AHB07747

Docket Number: MAX.409PR

APPLICATION DATA SHEET**Application Information**

Application Number: 62/793333
Filing Date: January 16, 2019
Application Type: Provisional
Subject Matter: Utility
CD-ROM or CD-R?: None
Title: SYSTEM AND METHODS FOR MANUFACTURING
A DRY ELECTRODE
Attorney Docket Number: MAX.409PR
Request for Early Publication?: No
Request for Non-Publication?: No
Suggested Drawing Figure: None
Total Drawing Sheets: 12
Small Entity?: No

Inventor Information

Status: Full Capacity
Given Name: Porter
Middle Name:
Family Name: Mitchell
Name Suffix:
City of Residence: Chandler
State or Prov. of Residence: AZ
Country of Residence: US
Street: 3888 Calle Fortunada
City: San Diego
State or Province: CA

Docket Number: MAX.409PR

Country: US
Postal or Zip Code: 92123

Inventor Information

Status: Full Capacity
Given Name: Frank
Middle Name:
Family Name: Bogenstahl
Name Suffix:
City of Residence: Ahaus - Wessum
State or Prov. of Residence:
Country of Residence: DE
Street: Am Kolk 3
City: Ahaus - Wessum
State or Province:
Country: DE
Postal or Zip Code: 48683

Inventor Information

Status: Full Capacity
Given Name: René
Middle Name:
Family Name: Wolters
Name Suffix:
City of Residence: Stadtlohn
State or Prov. of Residence:
Country of Residence: DE

Docket Number: MAX.409PR

Street: Bürgermeister-Bitting-Str.15
City: Stadtlohn
State or Province:
Country: DE
Postal or Zip Code: 48703

Inventor Information

Status: Full Capacity
Given Name: Christoph
Middle Name:
Family Name: Lansing
Name Suffix:
City of Residence: Vreden
State or Prov. of Residence:
Country of Residence: DE
Street: Adelheidstraße 2
City: Vreden
State or Province:
Country: DE
Postal or Zip Code: 48691

Inventor Information

Status: Full Capacity
Given Name: Jörg
Middle Name:
Family Name: Gottszky
Name Suffix:

Docket Number: MAX.409PR

City of Residence: Vreden
State or Prov. of Residence:
Country of Residence: DE
Street: Rentmeisterskamp 13
City: Vreden
State or Province:
Country: DE
Postal or Zip Code: 48691

Inventor Information

Status: Full Capacity
Given Name: Kay
Middle Name:
Family Name: Wolters
Name Suffix:
City of Residence: Vreden Stadtlohn
State or Prov. of Residence:
Country of Residence: DE
Street: Gutenbergstraße 1-3 Kiwitt 1
City: Vreden Stadtlohn
State or Province:
Country: DE
Postal or Zip Code: 48691-48703

Inventor Information

Status: Full Capacity
Given Name: Thomas
4 62/793333 Filed: January 16, 2019

MATTHEWS-00006514

C317.28

AHB07751

Docket Number: MAX.409PR

Middle Name:

Family Name: Hackfort

Name Suffix:

City of Residence: Vreden-Ahaus - Alstätte

State or Prov. of Residence:

Country of Residence: DE

Street: Gutenbergstraße 1-3 Öddingstraße 3A

City: Vreden-Ahaus - Alstätte

State or Province:

Country: DE

Postal or Zip Code: 48691-48683

Correspondence Information

Correspondence Customer Number: 20995

Phone Number: (949) 760-0404

Fax Number: (949) 760-9502

E-Mail Address: efiling@knobbe.com

Representative Information

Representative Customer Number: 20995

Applicant Information

Applicant Authority Type: Assignee

Applicant Name: Maxwell Technologies, Inc.

Street: 3888 Calle Fortunada

City: San Diego

State or Province: CA

5

62/793333

Filed: January 16, 2019

MATTHEWS-00006515

C317.29

AHB07752

Docket Number: MAX.409PR

Country: US
Postal or Zip Code: 92123

Dated: February 25, 2019

By:/Ian W. Gillies/

Ian W. Gillies
Registration No. 62,280
Registered Practitioner
Customer No. 20995
(858) 707-4000

29841765

Electronic Patent Application Fee Transmittal				
Application Number:	62793333			
Filing Date:	16-Jan-2019			
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE			
First Named Inventor/Applicant Name:	Porter Mitchell			
Filer:	Ian W. Gillies/Genneth Munar			
Attorney Docket Number:	MAX.409PR			
Filed as Large Entity				
Filing Fees for Provisional				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

MATTHEWS-00006517

C317.31

AHB07754

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
PROCESSING FEE FOR PROVIS. APPLICATIONS	1807	1	50	50
Total in USD (\$)				50

C317.32

MATTHEWS-00006518

AHB07755

Electronic Acknowledgement Receipt	
EFS ID:	35238994
Application Number:	62793333
International Application Number:	
Confirmation Number:	1719
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE
First Named Inventor/Applicant Name:	Porter Mitchell
Customer Number:	20995
Filer:	Ian W. Gillies/Chelsea Burdeno
Filer Authorized By:	Ian W. Gillies
Attorney Docket Number:	MAX.409PR
Receipt Date:	25-FEB-2019
Filing Date:	16-JAN-2019
Time Stamp:	16:40:03
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$50
RAM confirmation Number	022619INTEFSW16403400
Deposit Account	111410
Authorized User	Chelsea Veinot
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	
37 CFR 1.16 (National application filing, search, and examination fees)	
37 CFR 1.17 (Patent application and reexamination processing fees)	

MATTHEWS-00006519

C317.33

AHB07756

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request under Rule 48 correcting inventorship	Petition_MAX_409PR.pdf	299247 d1389b917884968827830b6184e00e143f0 70f53	no	2
Warnings:					
Information:					
2	Application Data Sheet	ADS_MAX_409PR.pdf	156597 e5cbe1b2b8c29bf4fd86ca06ebab78810b6 82502	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Fee Worksheet (SB06)	fee-info.pdf	30316 3b031aa7aa53df68161dba26c6699ae4266e ac27b	no	2
Warnings:					
Information:					
Total Files Size (in bytes):				486160	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p>New Applications Under 35 U.S.C. 111 If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p>National Stage of an International Application under 35 U.S.C. 371 If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p>New International Application Filed with the USPTO as a Receiving Office If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
62/793,333	01/16/2019		280	MAX.409PR		

CONFIRMATION NO. 1719

20995
 KNOBBE MARTENS OLSON & BEAR LLP
 2040 MAIN STREET
 FOURTEENTH FLOOR
 IRVINE, CA 92614

FILING RECEIPT



Date Mailed: 02/01/2019

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s)

Porter Mitchell, Chandler, AZ;
 Kay Wolters, Vreden, GERMANY;
 Thomas Hackfort, Vreden, GERMANY;

Applicant(s)

Maxwell Technologies, Inc., San Diego, CA;

Power of Attorney:

Ian Gillies--62280

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 01/31/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 62/793,333**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

page 1 of 3

MATTHEWS-00006521

C317.35

AHB07758

Title

SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier

license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 62793333

Document Date: 01/16/2019

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

At the time of document entry (noted above):

- USPTO employees may access SCORE content via eDAN using the Supplemental Content tab, or via the SCORE web page.
- External customers may access SCORE content via PAIR using the Supplemental Content tab.

Form Revision Date: August 26, 2013

MATTHEWS-00006524

C317.38

AHB07761

PTO/AIA/14 (02-18)

Approved for use through 11/30/2020. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

<input type="checkbox"/> Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1	<input type="button" value="Remove"/>		
Legal Name			
Prefix	Given Name	Middle Name	Family Name
<input type="button" value="▼"/>	Porter		Mitchell
Residence Information (Select One)		<input checked="" type="radio"/> US Residency	Non US Residency
City	Chandler	State/Province	AZ
Country of Residence		i	US

Mailing Address of Inventor:

Address 1	3888 Calle Fortunada		
Address 2			
City	San Diego	State/Province	CA
Postal Code	92123	Country i	US
Inventor 2	<input type="button" value="Remove"/>		
Legal Name			

Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="button" value="▼"/>	Kay		Wolters	<input type="button" value="▼"/>
Residence Information (Select One)		<input type="radio"/> US Residency	<input checked="" type="radio"/> Non US Residency	Active US Military Service
City	Vreden	Country of Residence i	DE	

Mailing Address of Inventor:

Address 1	Gutenbergstraße 1-3			
Address 2				
City	Vreden	State/Province		
Postal Code	48691	Country i	DE	
Inventor 3	<input type="button" value="Remove"/>			
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="button" value="▼"/>	Thomas		Hackfort	<input type="button" value="▼"/>

PTO/AIA/14 (02-18)

Approved for use through 11/30/2020. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Residence Information (Select One)			
<input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency Active US Military Service			
City	Vreden	Country of Residence ⁱ	DE
Mailing Address of Inventor:			
Address 1	Gutenbergstraße 1-3		
Address 2			
City	Vreden	State/Province	
Postal Code	48691	Country ⁱ	DE
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.			
<input type="button" value="Add"/>			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	20995		
Email Address	efiling@knobbe.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		
Attorney Docket Number	MAX.409PR	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Publication Information:

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under

35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	20995		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	<input type="text"/>	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

PTO/AIA/14 (02-18)

Approved for use through 11/30/2020. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Application Number	Country	Filing Date (YYYY-MM-DD)	Remove
			Access Code (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March

16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
Application Number			
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant must opt-out of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is ONLY reviewed and processed with the INITIAL filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby grants the USPTO authority to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant DOES NOT authorize the USPTO to permit a participating foreign IP office access to the instant

application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant DOES NOT authorize the USPTO to transmit to the EPO any search results from the instant patent

application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (02-18)

Approved for use through 11/30/2020. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	<input type="button" value="Remove"/>	
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>		
<input type="button" value="Clear"/>		
● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		

Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	Maxwell Technologies, Inc.		
Mailing Address Information For Applicant:			
Address 1	3888 Calle Fortunada		
Address 2			
City	San Diego	State/Province	CA
Country	US	Postal Code	92123
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (02-18)

Approved for use through 11/30/2020. OMB 0651-0032

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="button" value="▼"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="▼"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1	<input type="text"/>			
Address 2	<input type="text"/>			
City	<input type="text"/>	State/Province	<input type="text"/>	
Country	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>		Fax Number	<input type="text"/>
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Signature:		<input type="button" value="Remove"/>			
<p>NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).</p> <p>This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a juristic entity (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.</p> <p>See 37 CFR 1.4(d) for the manner of making signatures and certifications.</p>					
Signature	/ian Gillies/	Date (YYYY-MM-DD)			
First Name	ian	Last Name	Gillies	Registration Number	2019-01-16
Additional Signature may be generated within this form by selecting the Add button.					<input type="button" value="Add"/>

PTO/AIA/14 (02-18)

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAX.409PR
		Application Number	
Title of Invention	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

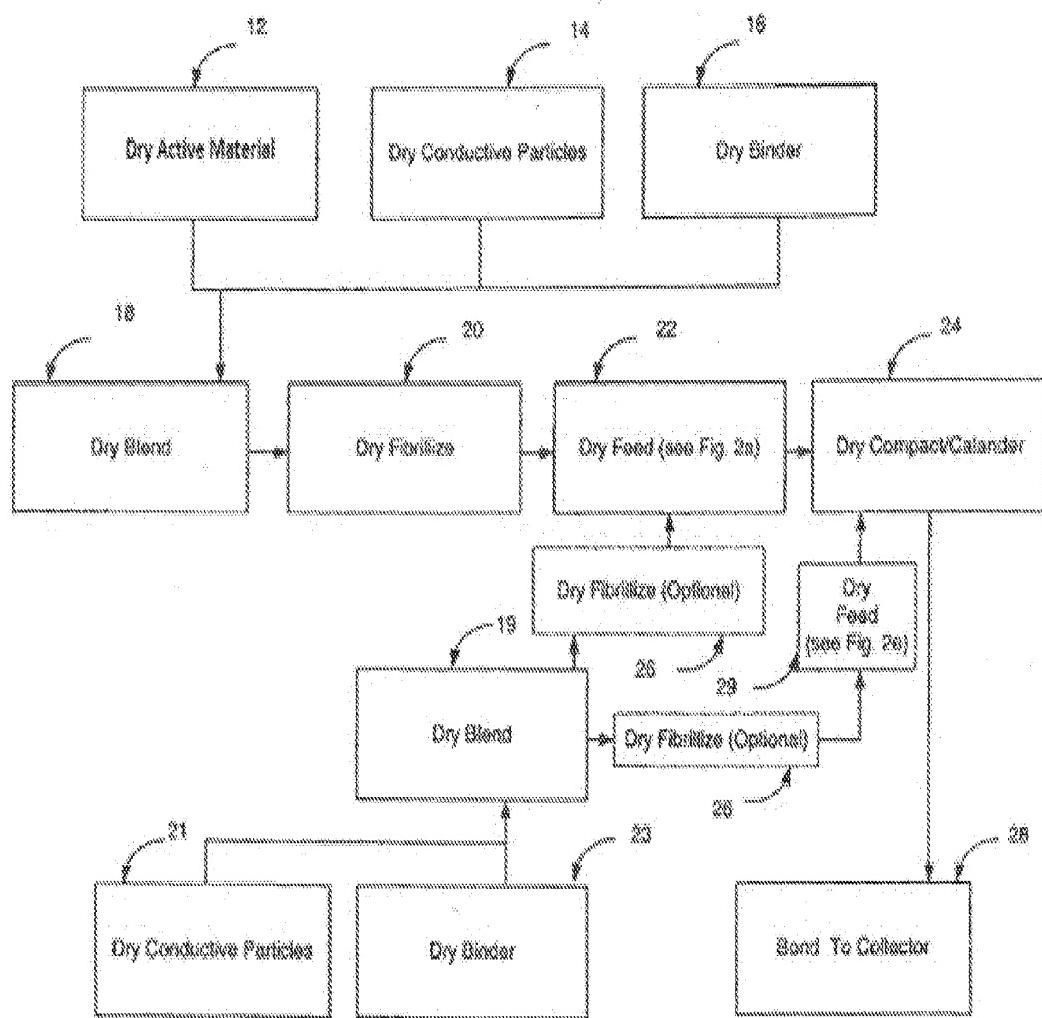


FIG. 1

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C317.48

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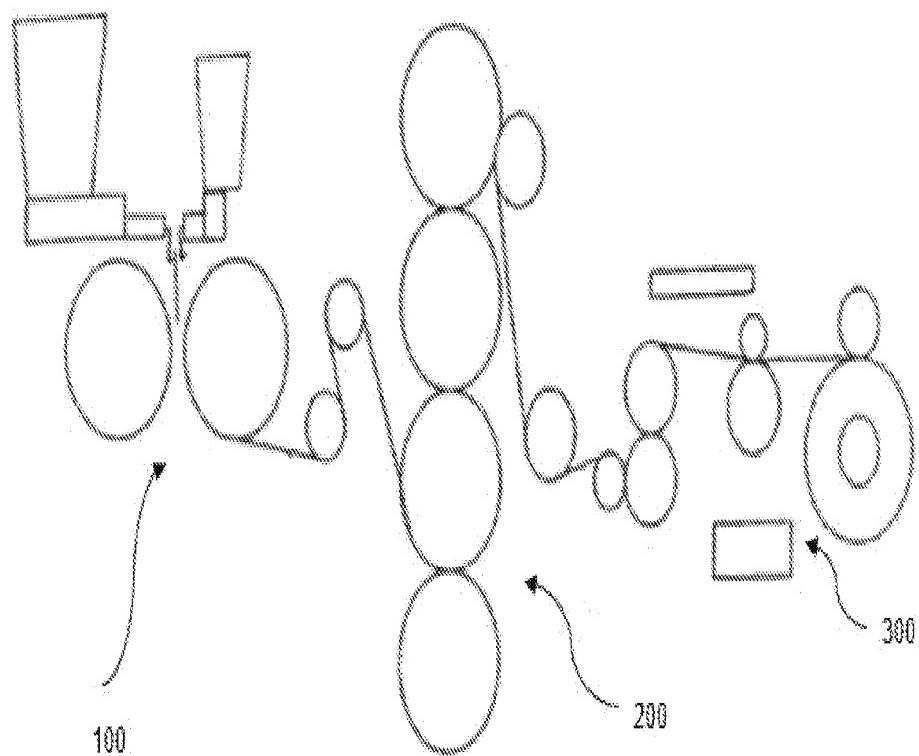


FIG. 2

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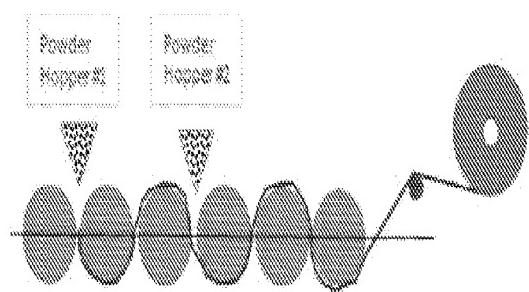


FIG. 3A



FIG. 3B

C317.50

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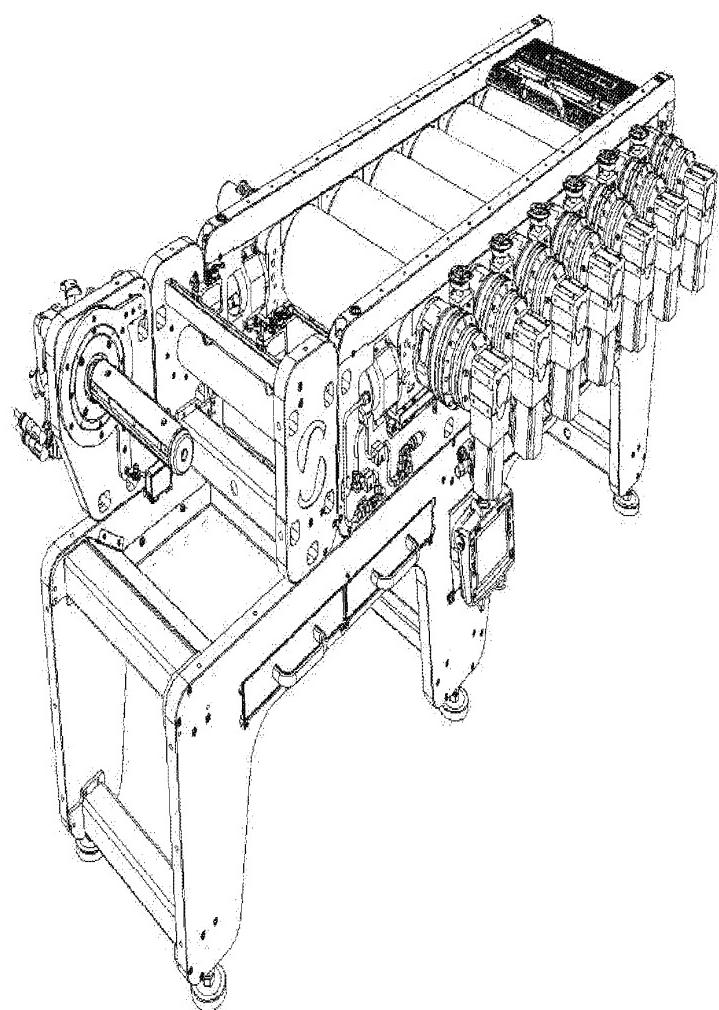


FIG.4

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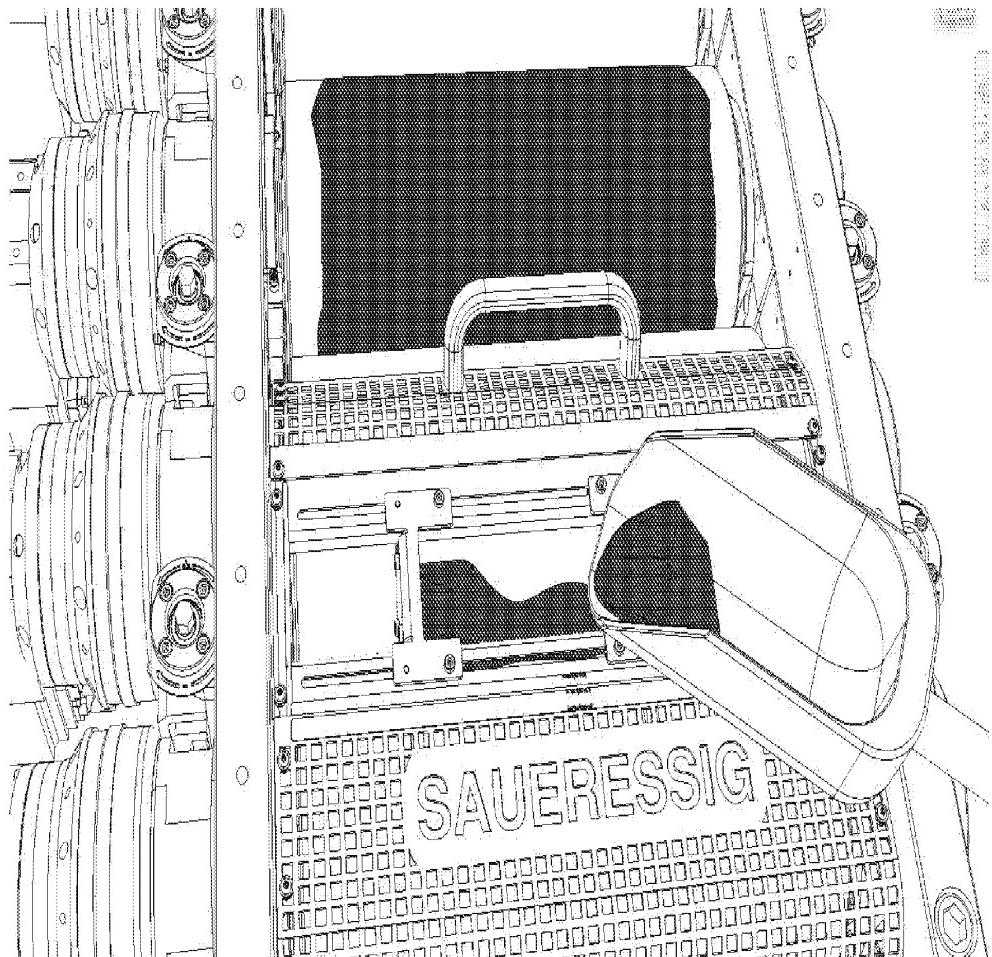


FIG. 5A

C317.52

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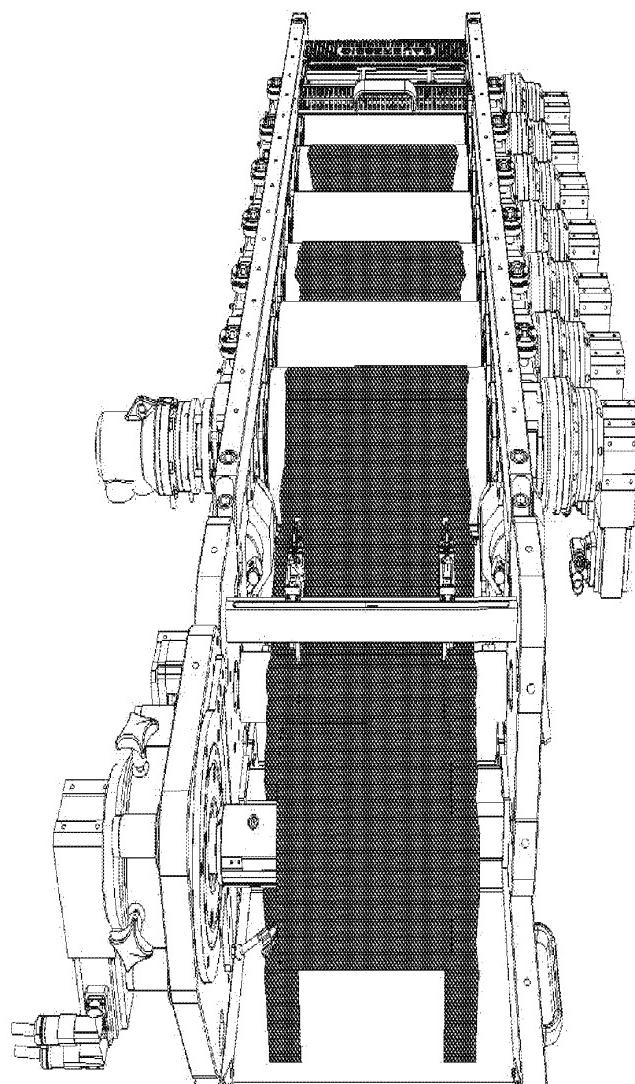


FIG. 5B

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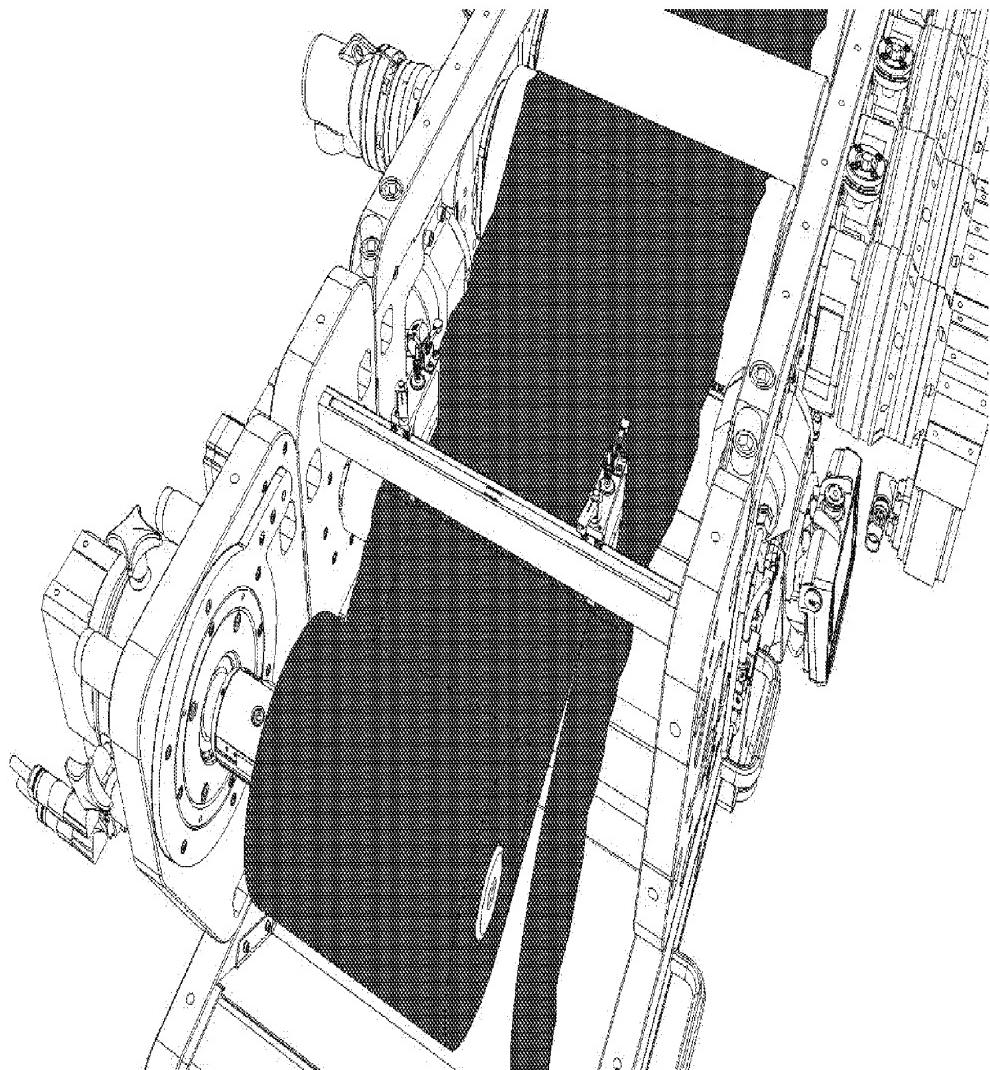
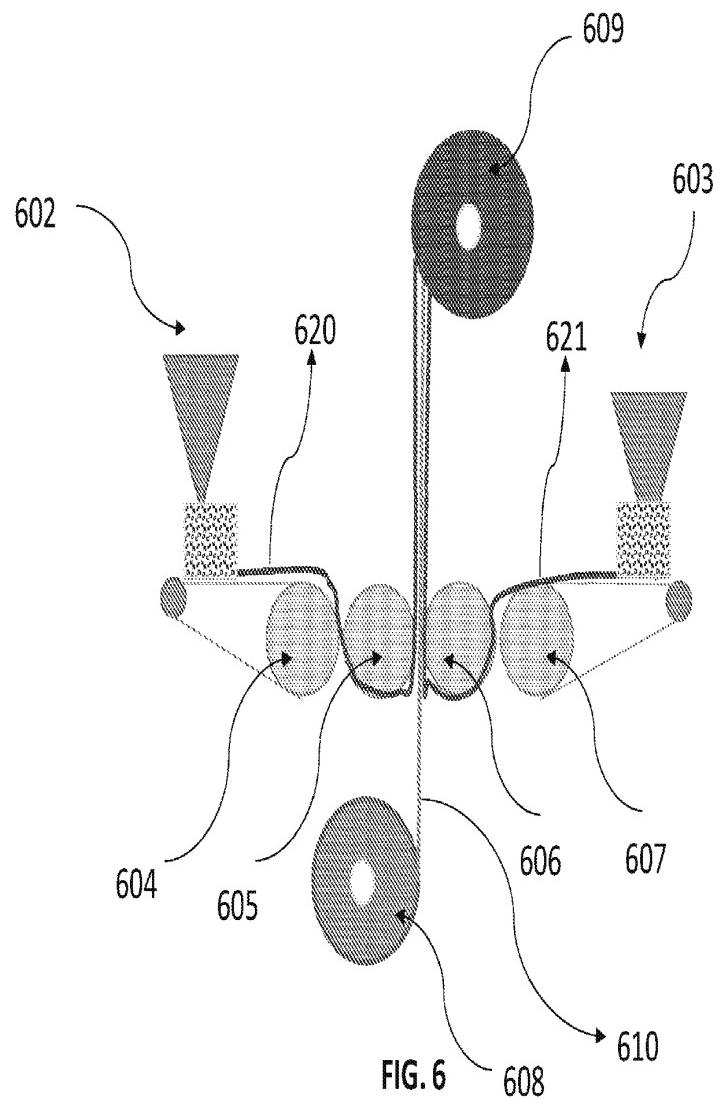


FIG. 5C

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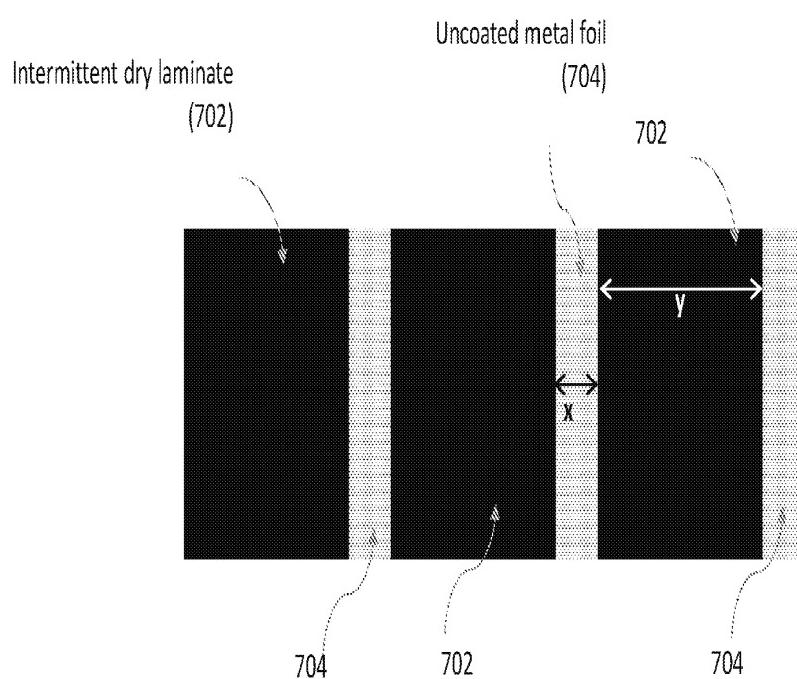


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FIG. 7



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FIG. 8A

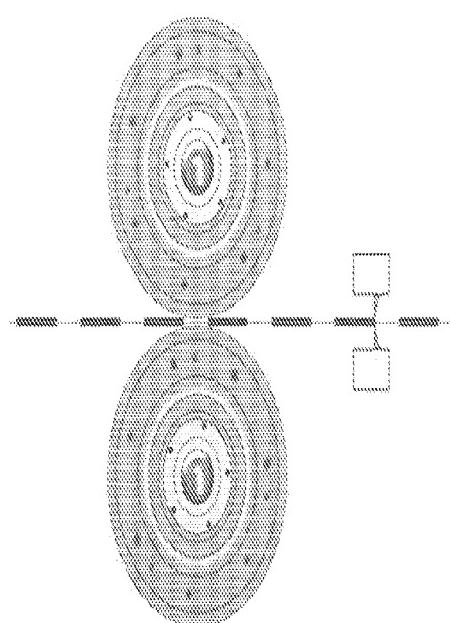
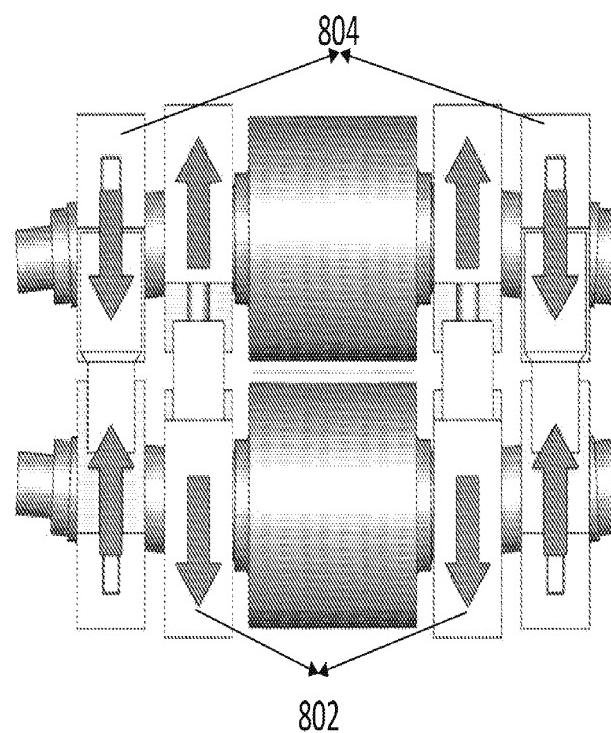


FIG. 8B



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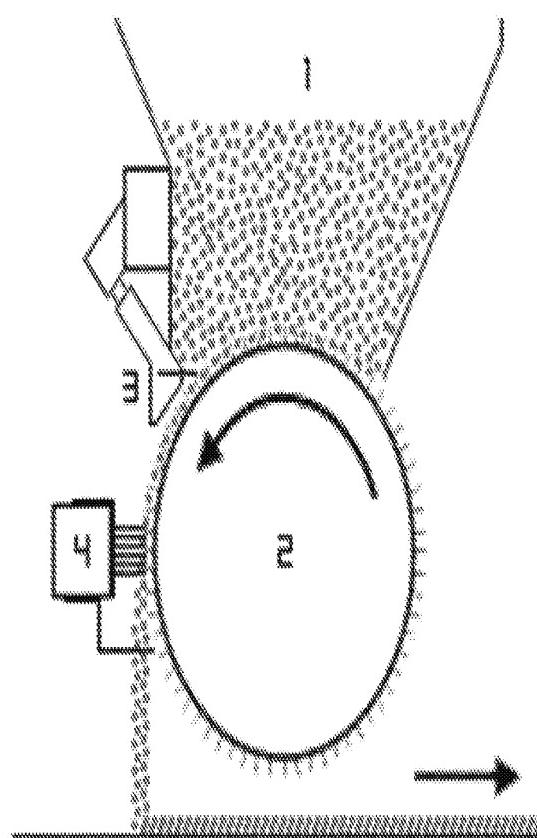


FIG. 9

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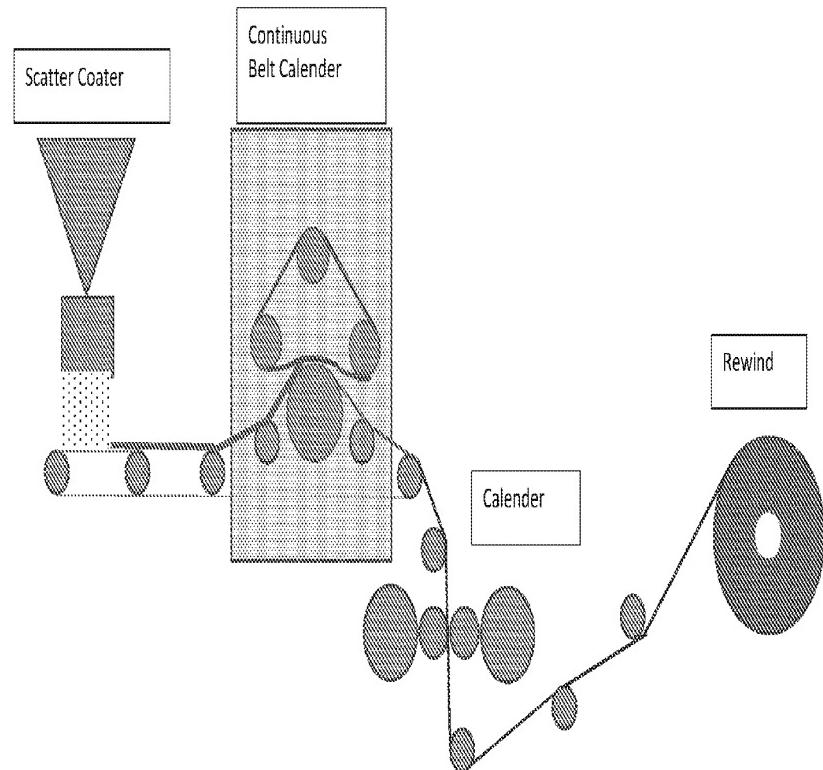


FIG. 10

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SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE**BACKGROUND**Field

[0001] The described technology generally relates to energy storage devices, and specifically to simplified systems and methods for manufacturing dry electrodes for energy storage devices.

Description of the Related Technology

[0002] Electrodes can be implemented within electrical energy storage cells, which are widely used to provide power to electronic, electromechanical, electrochemical, and other useful devices. Such cells include batteries such as primary chemical cells and secondary (rechargeable) cells, fuel cells, and various species of capacitors, including ultracapacitors. Electrodes can also be implemented within water purification systems. Decreasing the operating costs and improving the efficiencies of electrode manufacturing would be desirable.

SUMMARY

[0003] For purposes of summarizing the described technology, certain objects and advantages of the described technology are described herein. Not all such objects or advantages may be achieved in any particular embodiment of the described technology. Thus, for example, those skilled in the art will recognize that the described technology may be embodied or carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other objects or advantages as may be taught or suggested herein.

[0004] One inventive aspect is a system for manufacturing a dry electrode for an energy storage device. The system includes a first dry electrode material delivery system configured to deliver a dry electrode material, a first calendering roll, a second calendering roll, and a controller. The second calendering roll is configured to form a first nip between the first calendering roll and the second calendering roll. The first nip is configured to receive the dry electrode material from the first dry electrode material delivery system, and

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form a dry electrode film from the dry electrode material. The controller is configured to control a rotational velocity of the second calendering roll to be greater than a rotational velocity of the first calendering roll.

[0005] In another aspect, the dry electrode film is not self-supporting.

[0006] In another aspect, the system further includes a third calendering roll configured to form a second nip between the third calendering roll and a calendering roll positioned adjacent to and upstream of the third calendering roll, the second nip configured to receive the dry electrode film from the first nip. In another aspect, the upstream adjacent calendering roll is the second calendering roll. In another aspect, the controller is further configured to control a rotational velocity of the third calendering roll to be greater than a rotational velocity of the second calendering roll. In another aspect, the system further includes a current collector source configured to supply a current collector to the second nip, wherein the second nip is configured to receive the current collector and laminate the current collector to the dry electrode film to form a dry electrode. In another aspect, the system further includes a second dry electrode material delivery system configured to deliver a second dry electrode material. In another aspect, the first nip is configured to receive the second dry electrode material from the second dry electrode material delivery system and form a dry electrode film from the first and the second dry electrode material. In another aspect, the first and second dry electrode material are the same material. In another aspect, the system further includes a fourth calendering roll configured to form a third nip between the fourth calendering roll and a calendering roll positioned adjacent to and downstream of the fourth calendering roll, wherein the third nip is configured to receive the second dry electrode material from the second dry electrode material delivery system and form a second dry electrode film. In another aspect, the downstream adjacent calendering roll is the third calendering roll. In another aspect, the controller is configured to control a rotational velocity of the third calendering roll to be greater than a rotational velocity of the fourth calendering roll. In another aspect, the system further includes a current collector source configured to supply a current collector to the second nip, wherein the second nip is configured to receive the current collector and laminate the current collector to the first dry electrode film and the second dry electrode film to form a dual sided dry electrode.

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[0007] One inventive aspect is a laminator for manufacturing an intermittent electrode. The laminator includes a first calendering roll, a second calendering roll, one or more lamination actuators, and one or more gap control actuators. The one or more lamination actuators are configured to provide a first force between the first calendering roll and the second calendering roll during lamination of an intermittent electrode. The one or more gap control actuators are configured to provide a second force to the first and second calendering rolls, wherein the second force opposes and counteracts the first force.

[0008] In another aspect, the laminator further includes a sensor and a controller. The sensor is configured to detect non-coated areas within an electrode film. The controller is configured to engage the one or more gap control actuators when the non-coated areas within the electrode film pass between the first and the second calendering rolls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is a block diagram illustrating a process for manufacturing a dry electrode for an energy storage device.

[0010] **FIG. 2** shows an apparatus for forming a dry electrode film.

[0011] **FIGs. 3A-B** illustrate a side schematic view of a multi-roll calender system and a film made from said calender system, respectively.

[0012] **FIG. 4** illustrates a detailed isometric view of a multi-roll calender system.

[0013] **FIGs. 5A-C** illustrate some of the operating steps of the system shown in **FIG. 4**.

[0014] **FIG. 6** illustrates a side schematic view of a combination calender/laminator machine to form a dry electrode.

[0015] **FIG. 7** illustrates a side schematic view of an intermittently coated dry electrode according to an embodiment.

[0016] **FIGs. 8A-B** illustrate a side view and a front view of a laminator design.

[0017] **FIG. 9** illustrates a funnel-shaped charging hopper.

[0018] **FIG. 10** illustrates a calendering process comprised of a scatter coating process, a continuous belt calender process, a calender process, and a rewind process.

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DETAILED DESCRIPTION

[0019] Energy storage devices such as lithium ion batteries have been relied on as a power source in numerous commercial and industrial uses, for example, in consumer devices, productivity devices, and in battery powered vehicles. However, demands placed on energy storage devices are continuously—and rapidly—growing. For example, the automotive industry is developing vehicles that rely on compact and efficient energy storage, such as plug-in hybrid vehicles and pure electric vehicles. Lithium ion batteries are well suited to meet future demands.

[0020] Key components of the storage potential of an energy storage device are electrodes. The electrochemical capabilities of electrodes, for example, the capacity and efficiency of battery electrodes, are governed by various factors. For example, distribution of active material, binder and additive(s); the physical properties of materials therein, such as particle size and surface area of active material; the surface properties of the active materials; and the physical characteristics of the electrode film, such as density, porosity, cohesiveness, and adhesiveness to a conductive element. Dry processing systems and methods traditionally used a high shear and/or high pressure processing step to break up and commingle electrode film materials. Such systems and methods may contribute to structural advantages over electrode films produced using a wet process. However, the high processing pressures and large amount of equipment (and thus, the large footprint) used to form dry, self-supporting electrode films and dry electrodes leave room for improvement.

[0021] The systems and methods provided herein can be implemented to manufacture dry electrode films and electrodes for various energy storage devices. As provided herein, an energy storage device can be a capacitor, a lithium ion capacitor (LIC), an ultracapacitor, a battery such as a lithium ion battery, or a hybrid energy storage device combining aspects of two or more of the foregoing.

[0022] The various embodiments of systems and methods herein provide improved manufacturing of a dry electrode film and dry electrode for use in energy storage devices. The disclosed embodiments can provide a simplified and cost-effective procedure for manufacturing energy storage devices.

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[0023] The materials and methods provided herein can be implemented in various electrodes for energy storage devices and/or water purification. As provided herein, an energy storage device can be a capacitor, a lithium ion capacitor (LIC), an ultracapacitor, a battery such as a lithium ion battery, or a hybrid energy storage device combining aspects of two or more of the foregoing. In some embodiments, the method and apparatus for forming dry electrode film, as described herein, allow continuous, multi-stripes, or intermittent form factor electrodes.

[0024] Embodiments of method and apparatus for forming dry electrode film herein can provide one or more of the following advantages. Some embodiments allow for the fabrication of both thin and thick films in wide format, high precision low tolerance films, with adjustable densities. Some embodiments allow for films that are ultracapacitor (UCAP) or battery or Lcap or fuel cell electrodes, or water purification electrodes or combination of electrodes. Some embodiments allow for the reduction in factory floor area, material handling requirements and number of operator personnel, by combining calendering, laminating, peeling and slitting into one machine. Some embodiments allow for enabling multilayer functional webs by using one or more dry electrode material delivery systems, such as powder delivery hoppers. Some embodiments allow increases in the available diversity of formulations that can be used to make films and electrodes (such as self-supporting dry electrode films and dry electrodes), e.g., lithium metal powder, silicon/silicon oxides, cathodic or anodic active materials infused within porous conductive carbons, e.g. molten sulfur and activated carbon, solid state electrolyte, or other air/moisture sensitive materials.

[0025] Additional features or advantages provided by embodiments herein include a continuous process from raw material (e.g., powder) to a laminated electrode without rewind/unwind of one or more layers used to form the electrode. A dry electrode film formed by the system/method is not (at least initially, or throughout the entire process) required to be self-supporting, as it can be positioned on and supported by a calendaring roll during at least some, if not all, of the process steps. For example, the dry electrode film can be supported by at least one calendaring roll through all process steps within a multi roll calendaring system, through and including the lamination step, when the dry electrode film is laminated with a current collector to form a dry electrode.

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[0026] Embodiments of the multi roll calender(s) herein can have additional attributes not found in conventional calendering. The number of calender nips can be from two (three rolls) to six (seven rolls) or more, but at lower process pressures and forces. Each roll can be individually driven with a motor and gear drive and can be individually addressable. Line loads in a multi calender system can be much lower than in conventional calender yet the system can be configurable to achieve thinner dry films. Individual roll speeds can be controlled and individual gaps between each calender nip can be controlled. Individual roll temperatures can also be controlled. For example, in some embodiments, the final roll of the stacked multi roll system can be temperature controlled to assist with lamination of the dry electrode film(s) onto the current collector. Web handling can be simpler and easier, reducing or eliminating idler rolls within the web path. In some embodiments, adjacent roll sets (either within a paired calender nip, or between two adjacent nips) can be rotated at different speeds. For example, each subsequent, downstream roll set (e.g., calender nip) can be configured to rotate faster than the previous. Additionally, each individual roll in a two-roll nip set can be configured to rotate differently than the other roll in the same two-roll nip set. These different speeds can provide sheer within a film, and/or can create forces that improve the adherence of the film to any given roll.

[0027] In some embodiments, gauges, such as Gamma gauges, can be used for film thickness or specific mass measurements for thickness control/measurement. Rollers can be fixed in a unique position with playless bearings (orientated but captured bearings may be required). Conical bearings or other bearing designs can be used for playless fixation of rolls, provided the low tolerances of desired film thickness are achieved. Embodiments do not require the same diameter rolls for each nip or for rolls within the nip. The face finish on the rolls could be a coating, (e.g., chrome or hard face ceramic) or even patterned as in an embossing roll.

[0028] In some embodiments, two, multiroll calenders can be aligned end to end, allowing a dry electrode film to be laminated directly to a metal foil (e.g., current collector) without first having to remove the film and taken to a separate machine. Thus, the same machine can provide direct lamination of either single sided or double sided electrode layers onto a current collector to form a single or double sided electrode.

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[0029] In some embodiments, the laminated electrode can either be continuous web or intermittent electrode designs. Peeling of non-laminated films from laminated webs can be used for both continuous webs and intermittent electrode designs. In some embodiments, the current collectors that are used in the system can be pre-coated with adhesive, or the adhesive can be added to one side of the film through a separate powder hopper on the multiroll calender system, thus allowing direct lamination to the foil without first precoating the material. A slitter can be added after the lamination step to slit the laminated web to the final electrode width and rewind the individual electrode rolls. In some embodiments, the machine can be designed to be self webbing. For example, using a continuous belt under the rolls, which can rise up during the webbing to ensure the web moves in the proper direction and to the next roll nip.

[0030] **FIG. 1** is a block diagram illustrating a process for manufacturing a dry electrode for an energy storage device. **FIG. 1** is a block diagram illustrating a process for making a dry electrode for an energy storage device. As used herein, the term “dry” implies non-use of liquid-phase solvents and additives in mixing and coating process of electrode during process steps described herein, other than during a final impregnating electrolyte step. The process shown in **FIG. 1** begins by dry blending **18** dry active material particles **12**, dry conductive particles **18** and dry binder particles **16** to form a dry mixture. Furthermore, dry conductive particles **21** and dry binder particles **23** are also dry blended **19** to form a dry mixture which can be provided to the dry fibrillizing step **26** or **29**. The dry mixture is fibrillized in a dry fibrillizing step **20** using, for example, a jet-mill (not shown). During the dry fibrillizing step **20**, high shear forces are applied to the dry mixture in order to physically stretch it and form a network of thin web-like fibers. In a dry feed step **22**, the respective separate mixtures of dry particles formed in steps **19** and **20** are provided to respective containers (not shown) to form a dry film. The dry film is subsequently dry compacted and calendared by a roll-mill or calendar **24** to provide an embedded/intermixed dry film or a self-supporting electrode film (or electrochemically active free-standing film). The embedded/intermixed dry film is attached to a current collector (e.g., metal foil) **28**. A more detailed process of making an embedded/intermixed dry film including types of materials

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forming the dry films and materials forming the current collector is disclosed in U.S. Patent No. 7,352,558, which is incorporated by reference herein in its entirety.

[0031] A self-supporting dry electrode film manufactured above may provide improved characteristics relative to a typical electrode film that is manufactured using a wet process. For example, a dry electrode film as provided herein may provide one or more of improved film strength, improved cohesiveness, improved adhesiveness, improved electrical performance, or reduced incidence of defects. The defects may include holes, cracks, surface pits in the electrode film. The adhesiveness may be adhesiveness to a current collector. The electrical performance may be specific capacity. The film strength may be tensile strength.

[0032] **FIG. 2** shows an apparatus for forming a structure of an electrode. The apparatus in **FIG. 2** contains three inter-connected system portions, **100**, **200** and **300**. In **100**, dry particles are initially stored in containers and are fed as free flowing dry particles to a high-pressure nip of a roll-mill. Separate streams of dry particles become intermixed and begin to lose their freedom of motion as the dry particles are fed towards the nip. An intermixed compacted dry self-supporting film exits component part **100** and enters component part **200**. The compacted dry film, as it exits **100** must be a self-supporting film, in order to proceed further to portion **200** without falling apart. In order to be self-supporting, the film exiting the rolls in portion **100** has to be thicker than the actual desired electrode film thickness. Thus, in system portion **200**, the self-supporting film is fed through a tension control system into a calendering system (shown as four larger vertical roles), with a plurality of nips which iteratively compact the density and decrease the thickness of the dry film closer to a desired thickness/density. The dry film exits component part **200** and enters system portion **300**. Portion **300** comprises one or more idler rolls, dancer rolls, additional nips and/or a rewind/storage roll to further process the dry film into a final dry electrode film, which can be rolled in a rewind station. The final, rolled electrode film can then be transferred to another machine for unwinding and laminating to a collector to form a dry electrode.

[0033] **FIGS. 3A-B** illustrate a side schematic view of a multi-roll calender system and a film made from said calender system, respectively. The calender system can include one or more dry electrode material delivery systems, such as powder delivery

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hoppers. For illustrative purposes, the system includes two powder hoppers, shown as powder hopper #1 and powder hopper #2. The particles sizes, density, porosity, and/or type of materials, and/or other material characteristics in powder hopper #1 and powder hopper #2 can be the same with respect to each other. The particles sizes, density, porosity, and/or type of materials, and/or other material characteristics in powder hopper #1 and powder hopper #2 can be different with respect to each other.

[0034] The calender machine as shown comprises six rolls, although more or less quantities of rolls can be implemented. A downstream roll along the web path can be configured to rotate faster than the previous upstream roll. The increased downstream roll speed induces a shear in the film while in the roll nip causing the film to adhere to the faster rotating roll. An even further downstream roll can rotate even faster than the previous, and so forth, such that the film can remain adhered to all the rolls along the web path of the entire calender machine. This adherence can allow the film that is initially formed in the calender system in FIG. 3A to be formed from dry materials, but need not initially be self-supporting, because the film is supported and adhered to all the rolls along the web path. This adherence and support in turn can reduce or completely eliminate the need for idler rolls between roll nips, such as those described with reference to FIG. 2. The increased shear within the nip can also reduce the pressures and forces needed for calendering a film to a desired thickness, relative to other dry film equipment, such as that shown in FIG. 2. Thus, less complicated, and lower force (and thus smaller) equipment can be implemented, than that for the system in FIG. 2. Each roll temperature for the system in FIG. 3A can also be individually controllable. **FIG. 3B** illustrates a side view of a film made from a calender system such as that illustrated in **FIG. 3A**, when the particles in powder hopper #1 are different in size from the particles in powder hopper #2.

[0035] **FIG. 4** illustrates a multi-roll calender system. The system has six rolls with one powder hopper, for illustrative purposes; greater or lesser quantities are possible. Each of the six rolls along the web path can be configured to rotate faster than the previous roll, for film adherence, as described above. FIG. 4 shows individual motors (e.g., servo motors), the speed, acceleration, timing, etc., of which can be individually controlled with a controller (not shown). The controller can also be configured to control other aspects of the

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system, such as to control the gap distance between the rolls, the temperatures of each roll, and/or other system parameters. A controller can be similarly implemented within the other system described herein.

[0036] FIGS. 5A-C illustrate some of the operating steps of the multi-roll calender system of FIG. 4. In FIG. 5A, a powder is added to one roll nip section of the calender system. In FIG. 5B, the film is transferred between the rolls without need for idler rolls. In FIG. 5C, a doctor blade assists in the removal of film from the last roll. The film edges are trimmed and the film is then wound on a core.

[0037] FIG. 6 illustrates a combination calender/laminator system 600 which can manufacture two dry electrode films, and laminate them to a current collector, to form a double sided electrode. In FIG. 6, there are two dry electrode material delivery systems, shown as powder hoppers, 602 and 603 and four rolls, 604, 605, 606 and 607. A current collector 610 can be provided from a current collector source 608. A first dry electrode film 620 can be formed by calendering particles from powder hopper 602 through a first nip formed between rolls 604 and 605. A second dry electrode film 621 can be formed by calendering particles from powder hopper 603 through a second nip formed between rolls 606 and 607. Both films 620 and 621 can be laminated onto a first and second opposing side, respectively, of the current collector 610. The lamination can be provided by compressing (e.g., calendering) films 620 and 621, and current collector 610 between a third nip formed between roll 605 and 606. In addition to lamination, this third nip may also provide additional calendering and tuning of the film thickness of films 620 and 621. After lamination between rolls 605 and 606, the double sided electrode is collected for further processing, for example, via a rewind station 609. As illustrated in FIG. 6, the roll nips are positioned in sequence, and close together, which provides for continuous calendering and film thickness reduction, which reduces or completely negates the need for idler or dancer rolls. Each of the rolls in can be controlled for velocity, acceleration, speed, etc., as described elsewhere herein. The subsequent rolls each turn slightly faster than the last one allowing the film to follow the rolls to the last section where the film is pulled off the last roll and wound on a rewind.

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[0038] The system in FIG. 6 can be implemented to produce a single sided electrode, for example, by eliminating roll 607 and hopper 603, and without film 621. Additionally, rolls 604 and 607 are part of a belt-calender system as shown, in which the belt provides additional support and surface area for application of dry electrode material thereupon. One or more belt systems (like rollers 604 and 607) or non-belt systems (like rollers 605 and 606), or combinations thereof, can be implemented within any of the embodiments herein.

[0039] **FIG. 7** illustrates an intermittently coated dry electrode according to an embodiment. An intermittent electrode includes intermittently coated portions **702** with gaps **x** therebetween without coating, to form uncoated foil portions **704**. At least one of the uncoated foil portions **704** can be used for electrically connecting the electrode to other elements such as an electrode tab.

[0040] **FIGs. 8A-B** illustrate a side view and a front view of a laminator embodiment. The laminator can be implemented within a system such as system 600 in FIG. 6. The rolls in the laminator of FIGs. **8A-8B** can be similar to rolls **605, 606** in **FIG. 6**. The laminator can include one or more lamination actuators, such as pressure cylinders **804** which provide the main force which laminates the current collector and electrode film being fed through the laminator to form the electrode. However, during lamination of an intermittent electrode, such as that shown in FIG. 7, the rolls in the laminator can slam together when being compressed against the uncoated (foil only) portions 704. To reduce this slamming effect, the laminator can include one or more gap control actuators, such as cylinders **802** configured to oppose the forces in cylinders **804**, and provide constant gap during lamination in non-coated areas. A sensor (FIG. 8A) can be configured to detect non-coated or non-laminated areas. When detected non-coated or non-laminated area is detected, gap control cylinders **802** are engaged, to counteract the lamination pressure of the main force cylinders. The gap is maintained and the rolls do not slam into the non-coated areas which would otherwise deform or break the intermittent laminated web.

[0041] **FIG. 9** illustrates a funnel-shaped charging hopper which can be implemented within embodiments of the systems and methods described herein. The hopper can be supplied with bulk material by means of suction or worm conveyors. Inside the

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charging hopper the bulk material is uniformly distributed and the level is kept constant during the scattering process. Cavity formation and decomposition of the material is avoided through a special mixer. The rotary metering roller is fixed to the bottom side of the charging hopper. The size of the cells of the metering roller are selected according to the grain size of the bulk material. The bulk material is picked up by the metering roller and stripped at a flexible doctor blade. After that the accurately dosed bulk material is conveyed to an oscillating brushing device. Following the brushing process the bulk material will be examined and transferred to the subjacent substrate line.

[0042] FIG. 10 illustrates a calendering process comprised of a scatter coating process, a continuous belt calender process, a calender process, and a rewind process. A scatter coater can deposit a very thin layer of powder onto the belt and when the thin layer is calendered through the nip of the calender rolls, results in fabrication of a thin film. The powder is collected within the grooves or bristles of the main rotating drum then a secondary rotating brush removes the powder from the grooves or bristles allowing the powder to deposit onto the moving belt. Once the powder is compressed into a film within the first nip, the film will travel through the subsequent nips to achieve the desired thickness and or density.

[0043] An energy storage device as provided herein can be of any suitable configuration, for example planar, spirally wound, button shaped, interdigitated, or pouch. An energy storage device as provided herein can be a component of a system, for example, a power generation system, an uninterruptible power source systems (UPS), a photo voltaic power generation system, an energy recovery system for use in, for example, industrial machinery and/or transportation. An energy storage device as provided herein may be used to power various electronic device and/or motor vehicles, including hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), and/or electric vehicles (EV).

[0044] As used herein, the terms “battery” and “capacitor” are to be given their ordinary and customary meanings to a person of ordinary skill in the art. The terms “battery” and “capacitor” are nonexclusive of each other. A capacitor or battery can refer to a single electrochemical cell that may be operated alone, or operated as a component of a multi-cell system.

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[0045] Features, materials, characteristics, or groups described in conjunction with a particular aspect, embodiment, or example are to be understood to be applicable to any other aspect, embodiment or example described in this section or elsewhere in this specification unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive. The protection is not restricted to the details of any foregoing embodiments. The protection extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0046] Furthermore, certain features that are described in this disclosure in the context of separate implementations can also be implemented in combination in a single implementation. Conversely, various features that are described in the context of a single implementation can also be implemented in multiple implementations separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations, one or more features from a claimed combination can, in some cases, be excised from the combination, and the combination may be claimed as a subcombination or variation of a subcombination.

[0047] Moreover, while operations may be depicted in the drawings or described in the specification in a particular order, such operations need not be performed in the particular order shown or in sequential order, or that all operations be performed, to achieve desirable results. Other operations that are not depicted or described can be incorporated in the example methods and processes. For example, one or more additional operations can be performed before, after, simultaneously, or between any of the described operations. Further, the operations may be rearranged or reordered in other implementations. Those skilled in the art will appreciate that in some embodiments, the actual steps taken in the processes illustrated and/or disclosed may differ from those shown in the figures. Depending on the embodiment, certain of the steps described above may be removed, others may be added. Furthermore, the features and attributes of the specific embodiments disclosed above may be

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combined in different ways to form additional embodiments, all of which fall within the scope of the present disclosure. Also, the separation of various system components in the implementations described above should not be understood as requiring such separation in all implementations, and it should be understood that the described components and systems can generally be integrated together in a single product or packaged into multiple products. For example, any of the components for an energy storage system described herein can be provided separately, or integrated together (e.g., packaged together, or attached together) to form an energy storage system.

[0048] For purposes of this disclosure, certain aspects, advantages, and novel features are described herein. Not necessarily all such advantages may be achieved in accordance with any particular embodiment. Thus, for example, those skilled in the art will recognize that the disclosure may be embodied or carried out in a manner that achieves one advantage or a group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein.

[0049] Conditional language, such as “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements, and/or steps. Thus, such conditional language is not generally intended to imply that features, elements, and/or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without user input or prompting, whether these features, elements, and/or steps are included or are to be performed in any particular embodiment.

[0050] Conjunctive language such as the phrase “at least one of X, Y, and Z,” unless specifically stated otherwise, is otherwise understood with the context as used in general to convey that an item, term, etc. may be either X, Y, or Z. Thus, such conjunctive language is not generally intended to imply that certain embodiments require the presence of at least one of X, at least one of Y, and at least one of Z.

[0051] Language of degree used herein, such as the terms “approximately,” “about,” “generally,” and “substantially” as used herein represent a value, amount, or

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characteristic close to the stated value, amount, or characteristic that still performs a desired function or achieves a desired result.

[0052] The scope of the present disclosure is not intended to be limited by the specific disclosures of embodiments in this section or elsewhere in this specification, and may be defined by claims as presented in this section or elsewhere in this specification or as presented in the future. The language of the claims is to be interpreted broadly based on the language employed in the claims and not limited to the examples described in the present specification or during the prosecution of the application, which examples are to be construed as non-exclusive.

[0053] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the disclosure. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms. Furthermore, various omissions, substitutions and changes in the systems and methods described herein may be made without departing from the spirit of the disclosure. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the disclosure. Accordingly, the scope of the present inventions is defined only by reference to the appended claims.

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WHAT IS CLAIMED IS:

1. A system for manufacturing a dry electrode for an energy storage device, comprising:

- a first dry electrode material delivery system configured to deliver a dry electrode material;

- a first calendering roll;

- a second calendering roll configured to form a first nip between the first calendering roll and the second calendering roll, the first nip configured to receive the dry electrode material from the first dry electrode material delivery system, and form a dry electrode film from the dry electrode material; and

- a controller configured to control a rotational velocity of the second calendering roll to be greater than a rotational velocity of the first calendering roll.

2. The system of Claim 1, wherein the dry electrode film is not self-supporting.

3. The system of Claim 1, further comprising a third calendering roll configured to form a second nip between the third calendering roll and a calendering roll positioned adjacent to and upstream of the third calendering roll, the second nip configured to receive the dry electrode film from the first nip.

4. The system of Claim 3, wherein the upstream adjacent calendering roll is the second calendering roll.

5. The system of Claim 3, wherein the controller is further configured to control a rotational velocity of the third calendering roll to be greater than a rotational velocity of the second calendering roll.

6. The system of Claim 3, further comprising a current collector source configured to supply a current collector to the second nip, wherein the second nip is configured to receive the current collector and laminate the current collector to the dry electrode film to form a dry electrode.

7. The system of Claim 3, further comprising:

- a second dry electrode material delivery system configured to deliver a second dry electrode material.

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8. The system of Claim 7, wherein the first nip is configured to receive the second dry electrode material from the second dry electrode material delivery system and form a dry electrode film from the first and the second dry electrode material.

9. The system of Claim 7, wherein the first and second dry electrode material are the same material.

10. The system of Claim 7, further comprising a fourth calendering roll configured to form a third nip between the fourth calendering roll and a calendering roll positioned adjacent to and downstream of the fourth calendering roll, wherein the third nip is configured to receive the second dry electrode material from the second dry electrode material delivery system and form a second dry electrode film.

11. The system of Claim 10, wherein the downstream adjacent calendering roll is the third calendering roll.

12. The system of Claim 10, wherein the controller is configured to control a rotational velocity of the third calendering roll to be greater than a rotational velocity of the fourth calendering roll.

13. The system of Claim 10, further comprising a current collector source configured to supply a current collector to the second nip, wherein the second nip is configured to receive the current collector and laminate the current collector to the first dry electrode film and the second dry electrode film to form a dual sided dry electrode.

14. A laminator for manufacturing an intermittent electrode, comprising:

a first calendering roll;

a second calendering roll;

one or more lamination actuators configured to provide a first force between the first calendering roll and the second calendering roll during lamination of an intermittent electrode; and

one or more gap control actuators configured to provide a second force to the first and second calendering rolls, wherein the second force opposes and counteracts the first force.

15. The laminator of Claim 14, further comprising a sensor and a controller, the sensor configured to detect non-coated areas within an electrode film, and the controller

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configured to engage the one or more gap control actuators when the non-coated areas within the electrode film pass between the first and the second calendering rolls.

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SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE

ABSTRACT

[0054] A system and methods for manufacturing a dry electrode for an energy storage device are disclosed. The system includes a first dry electrode material delivery system configured to deliver a dry electrode material, a first calendering roll, a second calendering roll, and a controller. The second calendering roll is configured to form a first nip between the first calendering roll and the second calendering roll. The first nip is configured to receive the dry electrode material from the first dry electrode material delivery system, and form a dry electrode film from the dry electrode material. The controller is configured to control a rotational velocity of the second calendering roll to be greater than a rotational velocity of the first calendering roll.

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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE			
First Named Inventor/Applicant Name:	Porter Mitchell			
Filer:	Ian W. Gillies/David Pacheco			
Attorney Docket Number:	MAX.409PR			
Filed as Large Entity				
Filing Fees for Provisional				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
PROVISIONAL APPLICATION FILING	1005	1	280	280
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

C317.79

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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				280

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MATTHEWS-00006566

AHB07803

Electronic Acknowledgement Receipt	
EFS ID:	34878848
Application Number:	62793333
International Application Number:	
Confirmation Number:	1719
Title of Invention:	SYSTEM AND METHODS FOR MANUFACTURING A DRY ELECTRODE
First Named Inventor/Applicant Name:	Porter Mitchell
Customer Number:	20995
Filer:	Ian W. Gillies/Tony Do
Filer Authorized By:	Ian W. Gillies
Attorney Docket Number:	MAX.409PR
Receipt Date:	16-JAN-2019
Filing Date:	
Time Stamp:	20:29:28
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$280
RAM confirmation Number	011719INTEFSW20303300
Deposit Account	111410
Authorized User	tony do

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1256133 67d68caa6a8bd8c3c6650ba8800f6bf80337 6a8b	no	9
Warnings:					
Information:					
2	Drawings-other than black and white line drawings	Drawings.pdf	1352767 0738737274f58448bd8082a570c5c662e28 cbae6	no	12
Warnings:					
Information:					
3		Specification.pdf	92323 aca05a128c36da811941787a30678f146e6 b2bf0	yes	19
Multipart Description/PDF files in .zip description					
	Document Description		Start	End	
	Specification		1	15	
	Claims		16	18	
	Abstract		19	19	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29891 cf33e96b327e64458d8ddba11fb983d9ad2 74593	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			2731114		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

1 **EXHIBIT 13 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

4 **FILED UNDER SEAL**

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1 **EXHIBIT 14 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

4 **FILED UNDER SEAL**

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1 **EXHIBIT 15 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

4 **FILED UNDER SEAL**

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1 **EXHIBIT 16 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

4 **FILED UNDER SEAL**

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1 **EXHIBIT 17 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

4 **FILED UNDER SEAL**

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1 **EXHIBIT 18 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

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THE WALL STREET JOURNAL.

BUSINESS | AUTOS

Tesla Sues EV-Battery Supplier Over Alleged Disclosure of Trade Secrets

Tesla claims Matthews International improperly filed patent applications incorporating the electric-car maker's trade secrets

By [Sabela Ojea](#) [Follow](#)

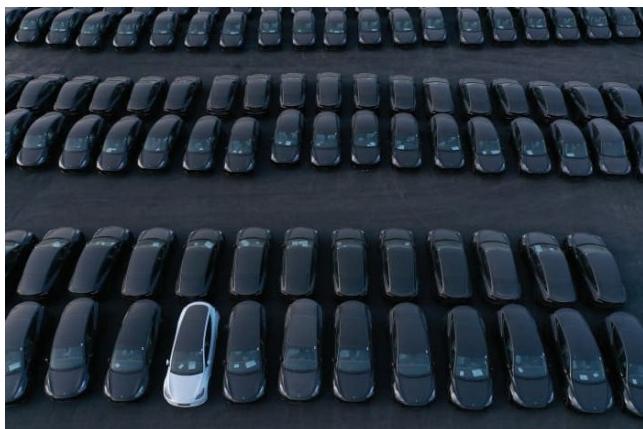
Updated June 17, 2024 3:13 pm ET



Gift unlocked article



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Tesla several years ago selected Matthews to be one of its suppliers.
Photo: Sean Gallup/Getty Images

[Tesla](#) [TSLA 2.66% ▲](#) has sued [Matthews International](#) [MATW 1.38% ▲](#), a supplier of electric-vehicle batteries, for allegedly disclosing its confidential trade secrets to other companies, including competitors.

According to the lawsuit, filed on Friday in the Northern District of California, Matthews breached its contract and allegedly improperly filed patent applications incorporating Tesla's trade secrets without the electric-vehicle maker's consent.

Matthews said that the claims are without merit and that it intends to defend itself against them. Matthews alleges that the lawsuit is intended to bully the company and "improperly take" its intellectual property.

Tesla said that, unless Matthews is enjoined from continuing its allegedly unlawful actions, Tesla would suffer immediate and irreparable harm. Tesla claims the monetary damages owed would likely exceed \$1 billion.

In 2019, Tesla selected Matthews to be one of its suppliers for equipment that it used to refine its dry-electrode-battery manufacturing and put it into mass production.

Tesla said that, since discovering Matthews's alleged improper conduct, the company has been working to block and/or delay publication of the affected applications. Only a subset of Tesla's confidential information regarding dry-electrode manufacturing has been published so far, according to the lawsuit.

Matthews refuted Tesla's allegations and said the complaint attempts to restrict the company from realizing the value of its intellectual property. Matthews also said that it continues to work with Tesla as a trusted supplier.

Write to Sabela Ojea at sabela.ojea@wsj.com

<https://www.wsj.com/business/autos/tesla-sues-ev-battery-supplier-matthews-over-alleged-disclosure-of-trade-secrets-6cba1632>

1 **EXHIBIT 19 TO THE DECLARATION OF JACOB MILLER IN SUPPORT**
2 **OF DEFENDANT'S OPPOSITION TO PLAINTIFF'S MOTION FOR A**
3 **TEMPORARY RESTRAINING ORDER**

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Tesla sues ex-supplier Matthews over EV battery trade secrets

By Blake Brittain

June 17, 2024 2:37 PM EDT · Updated 6 months ago



Tesla electric vehicle chargers are seen during a sunset at a petrol station in Xinzo de Limia, Spain June 10, 2024.
REUTERS/Nacho Doce

Companies



Matthews International Corp

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Tesla Inc

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June 17 (Reuters) - Tesla (TSLA.O), opens new tab has sued its former supplier Matthews International (MATW.O), opens new tab in California federal court for allegedly stealing trade secrets related to Tesla's battery-manufacturing process and sharing them with the electric-vehicle giant's competitors.

The lawsuit, opens new tab, filed on Friday in U.S. District Court for the Northern District of California, said Matthews owes damages that Tesla "conservatively estimates will exceed \$1 billion" for misusing company trade secrets related to dry electrode battery manufacturing technology.

June 17 (Reuters) - Tesla (TSLA.O), opens new tab has sued its former supplier Matthews International (MATW.O), opens new tab in California federal court for allegedly stealing trade secrets related to Tesla's battery-manufacturing process and sharing them with the electric-vehicle giant's competitors.

The lawsuit, opens new tab, filed on Friday in U.S. District Court for the Northern District of California, said Matthews owes damages that Tesla "conservatively estimates will exceed \$1 billion" for misusing company trade secrets related to dry electrode battery manufacturing technology.

The lawsuit said Matthews shared Tesla's innovations with unnamed competitors by selling "machines and other technologies embodying Tesla's trade secrets." It also said Matthews claimed Tesla's inventions as its own in patent filings that have revealed confidential Tesla information.

Tesla asked the court to block Matthews from misusing its trade secrets and hand over its patent applications in addition to requesting monetary damages.

Reporting by Blake Brittain in Washington Editing by David Bario and Nick Zieminski

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<https://www.reuters.com/business/autos-transportation/tesla-sues-ex-supplier-matthews-over-ev-battery-trade-secrets-2024-06-17/>